

REMARKS

Applicants have amended their claims in order to further define various aspects of the present invention. Specifically, Applicants have amended claim 1 to recite that a pitch between tips of first ones of adjacent leads at each of the four corners is wider than a pitch between tips of second ones of adjacent leads which are disposed at the relatively central portion of each of the four sides as compared to the four corners. Note, for example, the paragraph bridging pages 19 and 20 of Applicants' specification.

Moreover, Applicants are adding new claim 7 to the application. Claim 7, dependent on claim 1, recites that a pitch between adjacent bonding pads increases step wise from the relatively central position of each of the four sides to the four corners. Note, for example, the first full paragraph on page 24 of Applicants' specification.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the prior art applied by the Examiner in rejecting claims in the Office Action mailed December 10, 2004, that is, the teachings of the U.S. Patents to Shibata, No. 5,757,082, to Oga, et al., No. 5,708,295, and to Abbott, et al., No. 5,429,992, under the provisions of 35 USC 103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a semiconductor device as in the present claims, including, inter alia, wherein a die pad of the lead frame has a size which is smaller than that of the semiconductor chip of the semiconductor device, and wherein a pitch between tips of first ones of adjacent leads at each of the four corners is wider than a pitch between tips of second ones of adjacent leads which are disposed at the relatively central position of each of the four sides as compared to the four corners, of the main surface of the semiconductor chip, with a pitch between first ones of adjacent bonding pads at each of the four corners of the semiconductor chip being wider than a pitch between second ones of

adjacent bonding pads which are disposed at a relatively central position of each of the four sides as compared to the four corners. See claim 1.

In addition, it is respectfully submitted that these applied references would have neither taught nor would have suggested the other features of the present invention as in the remaining, dependent claims, having features as discussed previously in connection with claim 1, and, moreover, wherein the semiconductor chip is bonded to the die pad by an adhesive (see claim 2); and/or wherein the die pad has a circular shape (see claim 3) or cross shape (see claim 4) in plane view; and/or wherein the resin member is formed in a tetragonal shape with portions of the plurality of the leads protruding outwardly from the resin member at four sides of the resin member (see claim 5); and/or wherein a part of the resin member contacts with the rear surface of the chip except for areas to which the die pad is bonded (see claim 6); and/or wherein a pitch between adjacent bonding pads increases stepwise from the relatively central position of each of the four sides to the four corners (see claim 7).

Through the structure according to the present invention, since a clearance between bonding wires connected to adjacent leads at the corners can be formed wider, even if the bonding wire moves owing to the resin flowing into the outside region on one side of the semiconductor chip, at the corner of the semiconductor chip, generation of a short circuit between bonding wires can be suppressed. As a result, yield of plastic molded type semiconductor devices can be increased. Note the first full paragraph on page 7 of Applicants' specification. See also the paragraph bridging pages 19 and 20, and the first paragraph on page 23, of Applicants' specification.

Shibata discloses a semiconductor chip including a planar rectangular surface and a plurality of pads for wiring bonding arranged sequentially thereon along at least one of its sides, such that separations between mutually adjacent pairs of the pads (measured in the direction of the side) are smaller towards the center part than in the end parts of the side.

Such chip is bonded to a rectangular central portion of a frame having inner leads extending radially therefrom, with the pads each being connected by wire bonding to a corresponding one of the inner leads. See column 2, lines 30-41. Note also column 4, lines 11-18 and 40-50.

It is respectfully submitted that Shibata does not disclose, nor would have suggested, relative sizes of the die pad and chip, as in the present claims, and/or relative pitch of leads at the four corners as compared with that at the relatively central position of each of the four sides, as in the present claims, and advantages thereof as discussed in the foregoing.

It is respectfully submitted that the secondary references as applied by the Examiner would not have rectified the deficiencies of Shibata, such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Oga, et al. discloses a lead frame to be used for mounting a semiconductor chip, in forming a resin sealed semiconductor device. The lead frame includes, inter alia, outer frames for surrounding a predetermined space; a die pad disposed in the space surrounded by the outer frames; a plurality of leads extending from the outer frames; at least two support members extending from the die pad to positions away from the outer frames by a predetermined distance; and at least one insulating member for connecting the support members with at least one of the plural leads. The die pad is supported by the outer frames via the support members and the leads to be used for wiring. See from column 2, line 58, to column 3, line 7. This patent further discloses that it is preferred that the die pad has an area smaller than an area of the semiconductor chip to be mounted thereon. See column 4, lines 1 and 2. Note also column 6, lines 9-24; and column 10, lines 3-10.

Even assuming, arguendo, that the teachings of Oga, et al. were properly combinable with the teachings of Shibata, it is respectfully submitted that these teachings would have neither disclosed nor would have suggested the presently claimed subject matter, including

wherein, inter alia, a pitch between tips of first ones of adjacent leads at each of the four corners is wider than a pitch between tips of second ones of adjacent leads which are disposed at the relatively central position of each of the four sides as compared to the four corners, and advantages thereof as discussed in the foregoing.

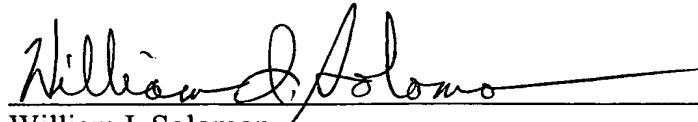
Abbott, et al. discloses packaging of integrated circuit devices; and describes a lead frame base having a plurality of leads and a die pad aperture defined by the leads. The lead frame base also has at least one first tie bar portion which extends towards the aperture. A die pad having a mounting surface for receiving at least one chip is also provided for the lead frame. The mounting surface is smaller than the at least one chip, such that perimeter surfaces of the at least one chip are substantially exposed when the at least one chip is mounted on the mounting surface. See column 3, lines 9-21. Note also column 2, lines 51-65; and column 3, lines 1-8 and 21-27.

Even assuming, arguendo, that the teachings of Abbott, et al. were properly combinable, with the teachings of Shibata and of Oga, et al., as applied by the Examiner, it is respectfully submitted that such combined teachings would have neither disclosed nor would have suggested the presently claimed device, including relative pitches of the leads, particularly together with the relative pitches of the bonding pads, in a device having, inter alia, a die pad having a side which is smaller than that of the semiconductor chip mounted thereon.

In view the foregoing comments and amendments, reconsideration and allowance of all claims presently in the application are respectfully requested.

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case No.: 501.37215VC3).

Respectfully submitted,
ANTONELLI, TERRY, STOUT & KRAUS, LLP.



William I. Solomon
Registration No. 28,565

WIS/ksh
1300 N. Seventeenth Street
Suite 1800
Arlington, Virginia 22209
Tel: 703-312-6600
Fax: 703-312-6666
April 11, 2005